

ABSTRACT

2 The enzyme, iron hydrogenase (HydA), has industrial applications for the
3 production of hydrogen, specifically, for catalyzing the reversible reduction of protons to
4 molecular hydrogen. The present invention relates to the isolation of a nucleic acid
5 sequence from the algae *Scenedesmus obliquus*, *Chlamydomonas reinhardtii*, and
6 *Chlorella fusca* that encodes iron hydrogenase. The invention further discloses the
7 genomic nucleic acid, c-DNA and the protein sequences for HydA. The genes and gene
8 products may be used in a photosynthetic process for hydrogen production which
9 includes growing a microorganism containing the gene coding for HydA in a culture
10 medium under illuminated conditions sufficient to accumulate an endogenous substrate;
11 depleting a nutrient selected from the group consisting of sulfur, iron, and manganese
12 from the medium; then allowing the culture to become anaerobic by consumption of an
13 endogenous or exogenous substrate in the light.

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